

THE EFFECT OF PERSONAL LEARNING PLANS ON LOW ACHIEVEING
ALGEBRA STUDENTS



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ABSTRACT

Reaching at risk students in the Algebra classroom is necessary for any school trying to make adequate yearly progress. Research has shown that students who are not successful in Algebra have a dramatically reduced chance of graduating high school, let alone attending college. The failure rate for Algebra students in Rockford, Illinois is incredibly high. Some teachers fail as many as 70% of their students. This study was conducted in order to find a better way to reach the students who are most at risk for failing Algebra. Parallel tasks were employed in a process differentiated classroom in order to raise student achievement in Algebra without lowering standards. Students engaged in the use of personal learning plans in order to navigate through the first semester of Algebra. Students completed parallel tasks based on their preferred learning style that was self identified. Homework completion rates and overall success on the comprehensive final exam were explored. A look at the success rates for students in each individual learning style was also explored.

Participants included 100 at risk Algebra students. Students were identified through teacher recommendation, district testing, and past performance in school. Each participant began a unit by taking a pre-test. The results of the pre-test were logged on a personal learning plan for each student. Only essential skills that the student had not already mastered needed to be

addressed. Students then received an activity matrix that allowed them to choose learning tasks appropriate to their learning style. Students worked through the activity matrix by completing a reading activity and then their chosen activity from a prescribed list. All students were given a date by which the unit must be completed. However, homework assignments were given out individually as students reached an understanding about each new skill they were acquiring. At the completion of the semester, all students were given a district wide comprehensive final exam.

The results of the study are encouraging. A 33.16% increase in homework completion over the previous school year was observed. The researchers also noted a marked increase in mathematical talk by students in the classroom. There was also a 6.34% increase in scores on the comprehensive final exam. When each individual learning style was investigated, significant gains were made by students who self-identified reading as their preferred learning style. More modest gains were made by visual and auditory learners. This study of personal learning plans with at risk Algebra students indicates that the large number of failures do not have to occur. The need for differentiation in the classroom has always been evident. This study shows that differentiation can help to bring those high failure rates down without lowering standards. Educators can use the methods outlined in this study to begin differentiation in their own classrooms and raise comprehension while lowering failures.

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CHAPTER ONE

INTRODUCTION

The teacher can lead a student to the door; the acquisition of learning is the responsibility of the students.

Chinese Proverb

Today's students are used to having information at their finger tips. They lack the skills though in how to implement such information. With the variety of technology and talents in one classroom, how can any teacher believe that "one lesson" will fit all. In order to meet the new demands of the classroom, teachers must differentiate the curriculum. The dilemma for teachers is in determining what to differentiate and when to do it.

Background

This study was conducted in Rockford, Illinois. Rockford is a large unified district with four main high schools and two alternative high schools. One hundred students enrolled at Jefferson High School in Algebra Essentials, a freshmen course, utilized personal learning plans. This represents 21.8% of the Freshmen Class. The total population of the School is approximately 2085 students. Jefferson High School is 45.1% Caucasian, 28.5% African American,

and 20.8% Hispanic. Sixty percent of students qualify for free or reduced lunch. Jefferson struggles with a twenty percent truancy rate and a 32.2% mobility rate. In order to be placed in Algebra Essentials, students had to have met certain criteria. Those criteria include: An Algebra Readiness score of 21 or less, 8th grade teacher recommendation, and a failing math grade at least twice in middle school (grades 5 through 8). The PSAE results from 2009 showed a 9.8% increase in reading scores; yet a 2.4% drop to 28.4% meeting or exceeding standards in mathematics.

Ten years into a teaching career, this researcher believes that a radically new approach is needed to reach the children in my classroom. After successfully completing the National Board Certification Process, the focus on helping every student succeed is back in the forefront of my classroom planning. Today's students do not learn the same way that children did five years ago. Teachers must adapt to the students not the other way around.

Importance of the Study

This study hopes to determine whether offering a truly differentiated curriculum improves the success of low achieving algebra students. It is widely accepted that all students do not learn in the same manner. However, teachers tend to create lessons that require students to do just that. Teachers have worked on addressing Howard Gardner's idea of multiple intelligences by varying the types of lessons that they utilize in their classrooms. By doing this, teachers have taken the first step toward differentiation. In these classrooms, teachers

still have kept all students at the same point in instruction. The class moves through the concepts at the same pace. In a fully differentiated classroom, students move at different paces through the curricular content. Pacing differences allow for students in the same classroom to be learning different concepts in different manners. All students are still held accountable for the same content by the end of the course; but they have been allowed to reach those goals at different rates and in different modalities. Differentiation plays to a student's strengths in order to work on their weaknesses.

Personal learning plans offer all students access to the same content; but through different modes of instruction in the same classroom. Each student is allowed to choose between three activities in order to develop a deeper understanding of content. Each activity is designed to meet the needs of a different learning style. All students complete a reading activity. The reading activity was used to access prior knowledge and develop the basic understandings of all students as a whole before they diverged on separate paths. Then each student chooses from a visual, auditory, or kinesthetic activity. Activities were assembled by the researcher. Activities varied from use of teacher tube videos, Computer Algebra Systems, to Algeblocks, or other activities that were teacher created. Sometimes, mini lessons received directly from the instructor were utilized. Whenever, more than six students in a class seemed to struggle with a particular topic, the instructor would pause class and deliver direct instruction to the whole group in order to clear up any misconceptions. The instructor also utilized a daily bell ringer as a means to clear up misconceptions

that were occurring. A sample plan for a unit can be found in Appendix B. All students regardless of instructional plan will take the same summative assessment at the end of each semester. These same assessments are mandated district wide for all algebra students. The researcher hopes to determine if differentiating instruction will produce increased levels of success in three key areas. The study will look at homework completion rates and academic success rates. The study also hopes to determine if different learning styles benefit more from this approach than others.

Statement of the Problem

The purpose of this study was to determine if the use of personal learning plans would increase academic success for low achieving Algebra students. Students who are not successful in the first year of Algebra in Rockford have a dramatically increased chance of not graduating from high school. Personal Learning Plans were used as a way to intervene with at risk freshman students.

Research Questions

- 1) How do personal learning plans affect the homework completion rate of low achieving Algebra students?
- 2) How do personal learning plans affect the academic success of low achieving Algebra students?

- 3) Is there a difference in academic success between learning styles using personal learning plans?

Establishing Program

In order to conduct this research, several things had to be completed before any students even entered the classroom. Each Unit of the District Pacing guide had to be broken down into essential skills. Each essential skill then had to be broken into the components that make up the skill. Each essential skill was listed as a main category with each component as a subcategory in a chart for students. Students were encouraged to use the chart to track their progress through mastery of the content. Once the unit charts were created, then the pre-test and post test for each unit had to be constructed. Questions were designed to address each of the essential skills and sub-skills. By addressing each sub-skill the teacher and student could track exactly where the misunderstandings lie. Post-Tests had to be aligned with the pre-test. The post-test assessed the same skills but with different questions and in a different order. A sample pre-test can be found in Appendix C and a sample post-test can be found in Appendix D. Once this process was complete, the next phase of implementation began.

Activity matrices had to be created to meet the needs of the four main learning styles: visual learners, auditory learners, reading learners, and kinesthetic learners. Every essential skill had to have four different activities for the students to utilize in order to learn the content. Next, a learning styles inventory (Appendix A) had to be utilized. The inventory used was presented to

all Rockford freshman teachers at a seminar in August. The inventory assessed students in all four areas. Teachers were to give the inventory and then discuss with students what their individual results meant. This was completed on the third and fourth days of school.

The first pre-test was administered on the fifth day of the school year. The next day students were given their personal learning plans based on the results of their pre-test and learning styles inventory. Students who had mastered an essential skill before instruction began were not required to complete the activities associated with it. Students were walked through how to follow the personal learning plan and the activity matrix. The researchers modeled the use of the personal learning plan using a hypothetical student and corresponding results on the pre-test.

All students completed the reading activity as required by the School Improvement Plan. This is where whole class instruction was utilized. The reading activities were completed as a whole group lead by the instructor. Only those students who needed to work on that particular essential skill participated in the whole group reading activity. Students were then allowed to choose from the visual, auditory and kinesthetic options. Students were required to try the option indicated by their learning style first. Only if that option was not successful in communicating the information they needed were they allowed to try a different learning style's approach. The teacher circulated the room and worked with students one-on-one as needed. This allowed for more personal attention for students. When many students were experiencing the same difficulties the

teacher would pause the class and conduct a direct instruction session to clear up the misconceptions. Students would then immediately return to their chosen activity.

After students completed an activity, they engaged in guided practice. When they had completed the guided practice with at least seventy percent accuracy, they were allowed to begin work on the next essential skill. In order to make sure students were progressing through the material, each unit had a set deadline when all essential skills needed to be mastered by. Students were often reminded with check points to make sure no one fell too far off a reasonable pace to finish the unit. Every two to three days a skills check exit quiz would be administered. Students completed five questions that related to the point in the unit they should be at. The quizzes were scored and returned to students with comments about what the student understood and did not understand. Students were encouraged to use the feedback to narrow their focus of study when necessary.

At the end of the semester, the district wide comprehensive final exam results were used to test for the academic effectiveness of the personal learning plans. The same semester exams were given in 2008/2009 and 2009/2010. Student scores were compared between each of the years. Homework completion rates were analyzed to see if a larger percentage of homework was completed when personal learning plans were used. Finally, the 2009/2010 results were compared to see if a particular style of learners outperformed others under the personal learning plan approach.

Limitations and Assumptions

This study is limited by the population of Jefferson High School and the 100 students enrolled in Algebra Essentials with Amy Tanascu and Cindy Corcoran as instructors. While the instructors are given all the latitude needed on how to present content to students, the pace at which the district prescribed content is taught is set by the Rockford School District. Walk-throughs are randomly conducted to ensure all teachers stay within 1-2 days of the pacing guide's recommendations. It is assumed that the final exams for each semester will remain constant from the previous school year.

While the instructors have no input into the students enrolled from year to year, it is assumed that the same placement requirements were used for the 2008/2009 and 2009/2010 academic years. This study also assumes that the mobility rate between both years will remain constant.

The School Improvement Plan requires reading activities to be utilized in all disciplines. Such activities used in the Algebra I course included but not limited too: using the textbook to create vocabulary four squares (word and definition, picture, example, counter example); using text to create graphic organizers relating operations to their inverse; writing summaries including picture of the types of solutions to a system of equations. All students completed the reading activities, hence, there could be no comparison of the effectiveness of the reading as the only strategy used. The results of all learning strategies are then in conjunction with reading.

Definition of Terms

The researcher used following terms consistently throughout this study:

AlgeBlocks: A set of manipulatives that are used with Algebra students.

These manipulatives are designed to give students a physical model to manipulate algebraic expressions.

Algebra Readiness Exam: A district developed exam given to all eight graders. The exam is used in placement of incoming freshmen into four different levels of mathematics.

At Risk Student: A student who was determined to be at risk of not graduating with their class due to performance in Middle School. Students who were absent more than 20% of the school year, failed math in either sixth, seventh, and/or eighth grade, and achieved a score of less than 21 on the Algebra Readiness Exam.

Auditory Learner: A student who learns best through vocal instruction. This includes but is not limited to lectures and class discussions.

Bell Ringer: A problem or set of problems that students routinely solve in the first five minutes of class.

Computer Algebra System: A computer program that actually completes algebraic problems. The system can be set to show intermediary steps when appropriate. Students use such systems to look for patterns and analyze procedures.

Essential Skill: A skill that all students must master in order to be prepared for the next class in a sequence.

Kinesthetic Learner: A student who learns best through manipulation of objects and other physical movement.

Mobility Rate: The percentage of students who leave Jefferson High School during the school year. This rate is calculated as a percentage of the original students enrolled as of August 31, 2008 for the 2008/2009 academic year compared to those still enrolled as of June 4, 2009. For the 2009/2010 academic year September 1, 2009 and June 3, 2010 are the dates being used for the calculation.

Reading Learner: A student who learns best through reading information on a topic. The reading material selected includes but is not limited to: textbooks, websites, journals, or posters.

Personal Learning Plan (PLP): An individualized plan for every student to move through the curriculum. The plan includes choices of activities designed for each of the learning styles. The plan does include deadlines for mastery of topics.

TI-Nspire CAS Software: Computer software that performs algebraic operations including variables. The software is used to aide students in the discovering of mathematical relationships.

Visual Learner: A student who learns best through watching demonstrations or videos. This student prefers to have concepts related to them through pictures.

Summary

Homework completion and academic success are the two measures used to determine the effectiveness of personal learning plans on at risk algebra students. The researcher wants to determine if differentiating instruction for every student will have a positive effect on both areas. The success of a student in the freshman year is highly correlated to whether or not a student will complete high school. Algebra in particular is a gateway class to higher learning. Students must be successful in Algebra if they are going to be successful in continuing their education after high school no matter what field they choose to study. Differentiation in the Algebra classroom is lacking. Freshmen students come into high school with a wide variety of skills and knowledge. This variety needs to be addressed in the mathematics classroom if the success rate for algebra is to be raised. Instructors must determine what their students already know and use that information to design individual lessons for students. Many teachers gather the information but do not understand what a fully differentiated classroom is and how to create one in their school.

CHAPTER TWO

LITERATURE REVIEW

Numerous strategies were investigated to determine what the best method for teaching algebra to at risk students would be. The research pointed to meeting students at their level and teaching in their learning style. Specifically, this literature review includes the topics of:

1. The history of Algebra education;
2. Use of differentiated Instruction;
3. Use of learning styles in the classroom;
4. Affects of differentiated instruction based on learning styles.

Algebra is generally accepted as the gateway course to higher mathematics and college. Students who master algebraic content are far more likely to complete college than those who do not (The National Mathematics Advisory Panel, 2008). However, the majority of at risk students are not successful in Algebra. According to Education Sector (n. d.) only 11% of students who only took Algebra I in high school enter college. They go on to point out that less than 3% of these students are able to complete a college level math course within eight years of high school graduation. Illinois currently mandates that all high school graduates take three years of math. Those courses must include one

year of Algebra and a course that includes geometry content (Illinois State Board of Education). This allows many students to graduate from high school without ever taking any class beyond Algebra. These students are not prepared for the technical world for which they live in. Many of the careers today require much more than Algebra skills. Construction workers need trigonometry and Geometry. The health sciences, engineers, and the business world need much more than the basics of Algebra today.

Robert Moses (2008) refers to Algebra as the new civil right. He exports the opinion that all students are entitled to learn Algebra as soon as possible, especially minorities. He believes that regardless of the student's preparation by the 9th grade all students should be placed in Algebra (Bracey, 2008). This is the same philosophy of the Rockford School District. Students who can not add and subtract integers are placed into Algebra. This push for Algebra for all students began over a decade ago.

President Clinton called for all students to take Algebra as early as the eighth grade (Loveless, 2008). Since that speech in 1998, there has been a 15% increase in the number of eighth graders taking Algebra and the State of Illinois has made it a required class for high school graduation (Loveless, 2008). Now that all students must take Algebra to graduate high school, teachers have to deal with the unprepared students in their classroom.

To deal with the vast number of students who are unprepared for Algebra, teachers turned to differentiated instruction. Carol Ann Tomlinson refers to differentiated classrooms as those that begin instruction at the level of the

students. Robyn Jackson (2010) calls this acknowledging the currencies a student comes with and building from there. Differentiated classrooms also design instruction around the style of the learner not the teacher (Tomlinson, 1999). Through the implementation of differentiated instruction many teachers have designed separate lessons for each type of learner. This is not differentiated instruction. Teaching the same material to the whole group several times using different methods is not what Tomlinson had in mind. Some teachers believe this is a form of Response to Intervention or RTI. This is not what the RTI portion of No Child Left Behind had in mind (Buffman, Mattos and Weber, 2010). A true differentiated classroom has multiple activities going on simultaneously. Each activity is designed to fit the needs of each learner (Tomlinson and McTighe, 2006). In order to create these simultaneous lessons, teachers need to know what the learning style is of each child.

There are many learning styles profiles that teachers can use. These are not the same as multiple intelligence tests. A quick search of the internet will reveal hundreds of different inventories to take. Neil Fleming and Colleen Mills (1992) developed the learning styles profile (VARK) used in this research. Based upon their research, the students were supposed to be able to apply their results to actual study habits. Auditory learners were supposed to develop a better understanding of why their note books were very empty. Kinesthetic learners were supposed to be able to increase their understanding of complex topics by focusing on case studies and examples from instruction. Many teachers tend to just give the inventory and discuss with students how they learn best. The

information is then just put to the side. With the VARK, students are taught how to reflect on their learning and how to adapt it to the learning environment they are in. Fleming and Collins believe that students as well as teachers need to adapt to the learning environment (2001). A teacher can not successfully meet the individual needs of every child but they can differentiate lessons to meet most of the students.

Teachers can differentiate by learning style in three main areas of instruction. The content, process, or product can be altered to meet the needs of each individual student (Levy, 2008). By using the learning style of each student to design different processes for students, a teacher can differentiate instruction without changing content or product. While there is evidence to show an increase in motivation for gifted and talented children when differentiation is used in product, what about the process for at risk students (Kondor, 2007)? Robert Marzano (2010) advocates that teachers treat low achieving and high achieving students the same. Hence, if differentiation increases the motivation of high achieving students why not low achieving students? These are the students who need a more individualized approach because of their status.

Teachers are encouraged by Tomlison (2001) to design a unit with multiple learning styles in mind. One way to truly meet this need is to offer choices in the process by which students learn. Offering choices in learning, allows students to have access to the same content and a voice in how they learn that content. This requires that every process lesson has multiple options for students. Marian Small (2010) refers to these as parallel tasks. Parallel tasks

are lessons that teach the same material in different manners that are occurring simultaneously in the classroom (Small, 2010). Since, students are not entirely one learning style always, student must be allowed to start one method, drop it, and pick up another as needed. This is voiced through Fleming's (2001) development of the VARK. He stresses that students might be dominant in one learning style, yet other styles should be built up by the teacher whenever possible (2001). The goal is to create the most well rounded learner possible.

The National Mathematics Advisory Panel and President Clinton have pointed out the strong need for Algebra for all. Schools have taken to this mantra and are placing all students regardless of background into Algebra I by ninth grade. Teachers must now deal with an even wider range for skills in their classroom. What is a teacher to do with the misplaced math student? Carol Ann Tomlison has espoused differentiated learning as the way to meet this challenge (1999). She cites many examples of how to run such a classroom. In order to do this, the teacher will need to keep in mind the words of Dennis Littky and Samantha Grabelle, "...start with the student, not the subjects or classes (2004)." Using Neil Flemings, learning styles profile, students will be able to adapt their own learning as well as the teacher adapting to the students. The State of Illinois has pre-determined the content, while the Rockford School district has determined the product. The teacher is only left with the process to differentiate. This research was conducted to see how an Algebra teacher might go about differentiating only the process which is under their control.

The information gathered through this review established a strong design for differentiating the process phase for each lesson. Using the information gained from the VARK, the teacher and students were able to adjust their modes simultaneously. Chapter Three will present the specific steps taken to differentiate by process and evaluate its effectiveness.

CHAPTER THREE

METHODOLOGY

The researcher observed that Algebra students entered with a wide variety of background knowledge and learning styles. To increase success in Algebra I, the researcher began to implement a personal learning plan based on the student's preferred learning style and individual background knowledge. The intention was to increase the mastery level of the Algebra I students on the comprehensive final exam. This is a district wide mandated exam.

Participants

The participants in the study were 100 freshmen students enrolled in Algebra I. All participants were labeled at risk in order to be placed in the sections with this particular instructor. This represents 21.8% of the freshmen class. The group of students is 35% Caucasian, 28% African American, 29% Hispanic, and 8% Multi-Racial. Of this group, 16% of the students have Individualized Education Plans for mathematics through their various special education classifications. An additional 3% receive special educational services for reading.

All participants were previously identified as at risk by the district for not completing high school. These students were flagged for being placed in smaller

classes with instructors who have had previous success with at risk students. The district used teacher recommendations, middle school grades, and the Algebra Readiness scores in order to identify these students.

Setting

Instruction took place in an Algebra I classroom that included seven hexagonal tables where students were seated in groups of four. All students had access to a TI-84 graphing calculator during class. Two computers with the TI-Nspire CAS software were available for student use. Only one computer had Internet access though. The instructor provided folders and notebooks to each student with their name labeled on each item. Each class had their own color coded set of folders and bin for storage. This enabled for easy pick up of class materials. Students were seated at tables with peers of similar preferences in learning style. This allowed for peer help when working through activities. This arrangement also allowed the instructor to help up to four students at one time while circulating the room.

Measures

In order to measure the effectiveness of the personal learning plans students were given learning styles profiles, pre-tests, skill checks, post-tests, and a final comprehensive semester exam. The same exam was given in the 2008/2009 and 2009/2010 school years. The results of the district wide comprehensive exams were compared to see if the personal learning plans with differentiated instruction improved the mastery level of the students. The

homework completion rates between the two school years were also compiled to see if the individual learning plans increased the rate of completion.

The learning styles profile was given to freshmen teachers across the entire district. All freshmen teachers district wide were to give the inventory and discuss the results with their students. Each school decided how to implement this. Our school had every Algebra I teacher administer and discuss the inventory.

Each pre-test (see Appendix C) was broken down in to the essential skills in the unit. Students received feedback about which skills they began the unit with and which skills they needed to acquire or improve upon.

Throughout the unit, the instructor administered skill checks as exit tickets from the class. Each skill check was five questions based on approximately where the students should have progressed to in the unit. Written feed back as well as a score was given to each student.

All post-tests (see Appendix D) were aligned to the pre-test. Questions addressed the same essential skills. Students were given set deadlines for when the post-test would be. This information was announced in class and typed at the top of the activities matrix.

The comprehensive final exam included seventy-three questions from units A through D that were administered in the first semester. All questions were given in a multiple choice format. All Algebra I students throughout the entire district took the same comprehensive final exam.

The first item students completed was the VARK (see Appendix A) to determine their preferred learning style. The students completed the survey on the third day of school, August 26, 2009. This learning styles profile separated the students into four preferences: Visual, auditory, reading, and kinesthetic learners. This information was then discussed with students on August 27, 2009. Each student generated a list of types of activities that would be best for them based on the results of their learning styles profile. This list was kept on the first page of their instructor supplied notebook.

All students then completed a pre-test on the topics for Unit A on August 28, 2009 (see Appendix C). On August 31, 2009, the students were given their personal learning plans (see sample in Appendix B) based on the results of their pre-test. Students then identified their individual goals for the unit. These were placed on the second page of the personal learning plan. The instructor disseminated the activity matrix for Unit A (see Appendix E) and explained to the students how to use their personal learning plans in conjunction with the activity matrix. A hypothetical student's learning plan was shown on the over head along with the activity matrix. The class answered verbally how to use the information to determine what activities the student should complete. Each student then mapped out their individual plan based on their own learning style and pre-test scores. The instructor circulated the room and gave a verbal approval to each student before they began their first activity.

All students were required to complete the reading activity listed first for each essential skill. Reading activities were designed to improve reading

comprehension and give students an overall perspective regarding the mathematical concept beyond following algorithms. The students often completed reading activities as a whole group. This is where the instructor used direct instruction to fill in the background of each essential skill that the students would need. The visual, auditory, and kinesthetic activities were used to teach algorithms or other problem solving methods. Students self-selected their activity based on their preferred learning style. Students who were unsuccessful with their activity of first choice were allowed to switch activities to another learning style for each essential skill as needed.

At pre-determined intervals based on the length of the unit and essential skills included, the instructor administered skills checks. These five question quizzes were given as exit tickets. Students had to complete the skill check before being allowed to leave class for the day. The instructor scored each skill check and gave written feedback to each student based. The feedback included both strengths of the student and weaknesses. Students adjusted their goals for the unit as needed. They checked off goals that were mastered on the post-test.

Any student who had not mastered at least 50% of the goals of a unit were required to re-test the unit. All students were encouraged to re-test until 100% of the goals were met. Prior to re-testing, students were to complete alternate activities for learning the concepts. These activities would be completed outside of class time. Students could either attend tutoring in the library with school staff or attend an afterschool session with the instructor. These same opportunities were available to students in the previous academic year as well. Due to district

policy, no student was required to complete such options. However, parents were called for any student in either year that had not met at least 50% of the essential skills required in the course. This cycle of pre-test, skills check, post-test, and re-testing continued for all four units of instruction for the first semester.

At the conclusion of the four units of instruction, students were given the review for the final exam. The same review was given for both the 2008/2009 and 2009/2010 school years. Students for both years were given the same final exam on regularly scheduled final exam days. Each exam period lasted 90 minutes and TI-84 graphing calculators were provided for the students.

Summary

The methodology began with identifying the personal learning styles of each student and a discussion with students of how to use that information in their learning choices. Then for each unit, students took a pre-test in order to determine what their strengths and weaknesses were. Students then progressed through the activity matrices as indicated for each learner. Skill checks were used to monitor student progress through each unit and provide students with feedback about their learning. Post-tests were given to help students track their growth throughout the unit. Students whose post-test results were not at least 50% of the essential skills in the unit had the opportunity to re-test after coming in outside of class time for remediation. The summative assessment as a final comprehensive exam was the last step in data collection.

This methodology has described procedures that were used to study the effect of personal learning plans for at risk students in an Algebra I course. The data that was collected was used to examine the effects on homework completion rate and performance on a comprehensive final exam. In the next chapter, the researchers' findings will be discussed.

CHAPTER FOUR

FINDINGS

Personal learning plans were utilized with 100 at risk Algebra I students in the hopes of improving their mastery of skills. Ninety-five students who began the study completed the semester with the instructors. The plans were tailored for each of the major learning styles of the students: visual, auditory, reading, and kinesthetic. Each unit consisted of a pre-test, skills checks for each essential skill, and a post-test. Students completed a series of activities that were designed for their individual learning needs after they received their pre-test results. Skills checks were used to monitor student progress through the unit. After the completion of a unit, a post-test was administered to students. Students who were not satisfied with their post-test score were encouraged to attend tutoring and re-take another version of the post-test until they mastered all skills in the unit. At the completion of four units of study all, students were given a comprehensive final examination.

The personal learning plans were implemented with 100 students. Ninety-five students remained with the instructors throughout the course of the semester. Only 90 students took the comprehensive final exam. Three students exempted the exam and two students never took the final exam at all. The

students are racially diverse and 16% have already been identified for special services through an individualized education plan for mathematics. (see Table 1)

Table 1

Profile of Students Participating in the Study

	Number of Students
Students who began the study	100
Students who completed the entire semester	95
Students who took the final examination	90
African American	28
Caucasian	35
Hispanic	29
Multi-Racial	8
With an IEP for Mathematics and Reading	16
With an IEP for Reading only	3

Homework is readily believed to be necessary for the majority of students in a mathematics classroom. Few students are able to master a skill without ever practicing it independently. Homework is assigned to meet this need for independent practice. Since the personal learning plans began, homework completion rates rose for each individual quarter steadily. There was an increase of 11% in the first quarter and 33% in the second quarter. Overall for the semester there was an increase of 22.65%. (see Table 2)

Table 2

Homework Completion Percentages of Students in Algebra I

	Units A-B2 Quarter 1	Units C1-D Quarter 2	Total Completion Rate
2008/2009	67.74%	52.24%	60.12%
2009/2010	78.86%	85.40%	82.77%
Difference Between Years	11.12%	33.16%	22.65%

The instructors noted a dramatic increase in student participation in class and on task behavior. The instructors also observed an increase in student to student mathematical talk. Pairs and groups of students were heard talking to each other about how to complete problems and why certain algorithms were performed. The increase in cooperative learning between students was evident in all units of study.

The success of students on the final examination also rose. Ninety students of the 95 who completed the semester took the final examination. Of the five students who did not take the final examination three students exempted under school policies regarding a student with a 3.5 or higher G.P.A. and an "A" average in the class. Only one student was eligible to exempt the final exam in the 2008/2009 school year. The remaining two students never took the final examination for the course due to extra-ordinary circumstances. There was an increase of 6.34% in the 2009/2010 school year over the 2008/2009 year. (see Table 3)

Table 3

Final Examination: Overall Percent Correct

	Average %
2008/2009	41.14%
2009/2010	47.48%
Difference	6.34%

The researcher also noted a difference in the final exam averages for each of the different learning styles that the students identified at the beginning of the study. All students completed two activities and a homework assignment for each essential skill. Every student completed the reading activity and then an additional activity chosen from: visual, auditory, and kinesthetic. While reading was identified by the smallest number of students, those students scored on average 10% higher on the final exam than all other groups. However, kinesthetic learners scored 6.34% less than the overall class average in the final exam. The details of the final exam results are below in Table 4.

Table 4

Final Exam Results by Learning Style

	Visual	Auditory	Reading	Kinesthetic
Number of students per learning style	36	16	11	27
Average Percentage on Final Exam	46.96%	48.03%	58.16%	40.74%

Summary

Through the use of personal learning plans the researcher observed a 22.65% increase in homework completion. In addition to the increased individual practice, the researcher noted the instructors' observations of increased

mathematical talk among students. This increased activity by the students translated into a slightly more than 6% increase in the final exam average over the previous year.

All educators would most likely agree that student learning is at the forefront of their decisions in the classroom. This is what leads lesson planning and all interactions with students. Finding a way to reach all students is the ultimate goal. As educators, we realize that not every student is the same and they certainly do not learn in the same manner. It is our job as educators, to engage our students in a meaningful way that works for them as individuals. Personal Learning Plans are the first step this researcher and instructor have taken to reach this goal.

CHAPTER FIVE

DISCUSSION

The researchers believe that at risk students have not been presented with educational experiences that have met their needs and increased their self confidence. Personal learning plans offer each individual student the opportunity to experience success in the classroom. This in turn will increase their self confidence as the number of successful classroom experiences increases. Successful class experiences will tap into a student's strengths. The activities will begin at a student's current level of understanding and build from there. This is what the researcher's believe to be best practice with all students as indicated by the work of Carol Ann Tomlison (1999) and others on differentiation.

At risk students tend to not believe in themselves. They do not see the need for an education or even that they are capable of learning. These students tend to give up before ever even trying. Their previous experiences have not been successful and have led the students to a defeatist attitude. The use of differentiated instruction through personal learning plans is designed to reach every student, show them they can learn, and increase their self confidence. By increasing a student's self confidence in their ability to learn, students are more likely to take risks academically, ask questions and increase their learning.

These are the overall goals of any classroom. Students who believe in themselves are open to new experiences and are ready to learn.

How do personal learning plans affect the homework completion rate of low achieving Algebra students?

The use of personal learning plans increased student understanding as shown through the large increase in the homework completion rate. A 22.65% increase in homework completion was observed. This shows an increase in mathematics completed outside of class time by the students. Typically students do not complete homework for a variety of reasons. One of those reasons is a lack of understanding of the material. If a student does not understand the material, how are they supposed to answer questions about it? Personal learning plans were designed to help each student learn the material at their own pace and in a manner that suits them. Homework is then assigned at different times for each student. They are not assigned homework until they have shown an understanding of the topic in class. This is the heart of what Tomlison (1999) and Levy (2008) say about differentiated instruction. The content and product were held constant for all students with only the process being differentiated. The use of differentiated instruction is supposed to increase learning for all students. Completion of homework increases understanding. Assigning homework to each individual student when they are ready, naturally increases the chances that they will actually complete the work.

This increase did not happen immediately. The first quarter (9 weeks) was an adjustment period for the students. These students were accustomed to direct instruction every period of the day and just sitting passively while the teacher gave out information. This new learning arrangement took time for the students to become accustomed to. This is evidenced by the first quarter increase being at 11.12%, while second quarter homework completion rose by 33.16%. As students adjusted to the new format, they grew more confident in their work and completed more assignments. Not only were more assignments completed, the researchers observed an increase in mathematical talk in the classroom. Students were helping one another and talking about mathematics more. This student to student interaction increased learning for all students. In the 2008/2009 academic year, there was a decrease in homework completion between quarter one and quarter two. Under the personal learning plans not only was there not a decrease but a dramatic increase.

How do personal learning plans affect the academic success of low achieving Algebra students?

The results show an increase in the comprehensive final exam scores of 6.34%. This translates to more than half a letter grade on the final exam. This is extremely significant for at risk students. An increase of this size demonstrates their ability to do mathematics. Many students who are at risk do not have self confidence in their ability to learn. The success with the varied activities and teacher feed back helped the students realize that they can do mathematics and

they can learn. Just increasing a student's belief in themselves is a success when working with at risk students. The results indicate that these students can learn if the material is presented to them in a format that fits their individual needs. This is what differentiated instruction is all about.

Tomlinson and McTighe (2006) advocate for teaching students where they are at and in a manner that they the students prefer. This requires teachers to adapt to each individual student. Personal learning plans allow the teacher to meet the needs of each individual student where they are not where a teacher wishes they were. This is what the essence of teaching is about, helping each child learn. While this task can seem overwhelming a classroom can hold twenty-five students all working on different activities yet progressing toward the same goal. Total differentiation of process can occur in a mathematics classroom.

Is there a difference in academic success between learning styles using personal learning plans?

Visual, auditory and reading learners all showed increases on the final exam. Students who identified themselves as reading learners from the VARK benefited the most from the personal learning plans. They increased 17.47% over the class of 2008/2009. However, reading learners not only completed a reading activity for every skill they also completed a second activity. This second activity was usually tied to their second most preferred learning style. This advantage could explain the large change observed in the study. Auditory

learners increased by 6.79% and visual learners increased by 5.82%. For these three sets of learners there was an average increase of 8.13%.

Only kinesthetic learners showed a decrease of 0.4% which is barely notable at all. However, kinesthetic learners were the second largest group of students. The relatively unchanged success rate in this group can be explained by looking at the instructional methods used in 2008/2009 as compared to the kinesthetic activities in 2009/2010. The majority of kinesthetic options available on the personal learning plans were whole group activities the previous school year. Since kinesthetic learners completed the same tasks as the control group from 2008/2009, the only difference occurring in the mandatory reading activity, then any change in results would not be expected for this group. This is exactly what the researchers found.

General Reflections

The researchers found success in the homework completion rate and the overall comprehensive final exam. The increase in mathematical talk by the students that was exhibited was encouraging. Students who can speak mathematics are learning mathematics. However, the small sample of students limited the impact of the study. A larger group of students is needed to determine if the personal learning plan's success rates will hold. A look at student attitudes toward mathematics is an additional area of focus for follow up studies. An attitudinal survey could be given at the beginning of the semester as well as one at the end of the semester. The survey results could then be

compared and analyzed for student perceptions of their ability to learn mathematics and their like or dislike for the subject. The researcher believes that if this study is repeated that the attitudinal information would be vital change. Knowing student attitudes about their own learning would give the researcher a baseline for self confidence in mathematics. Since self confidence is such an issue for at risk students, knowing concretely whether the personal learning plans helped to raise this in the students would be beneficial for teachers in my district.

This study was conducted in a large urban district where the majority of high school students do not meet state standards or graduate. Finding new ways to help these students be successful without lowering standards is at the forefront of many educators' minds. Thousands teachers say they want to differentiate instruction but they do not know how. This study shows not only can a truly differentiated mathematics classroom occur but it can in their school. Often teachers comment about their students being different and their challenges being harder. This study was conducted with the same students that populate their classrooms. The results show that student achievement can be raised, large classes can be differentiated, and students will do their homework if they are prepared for it.

Future research on the topic should incorporate a larger group of students across multiple environments including rural and suburban as well as urban. The attitudinal survey should be presented to students before personal learning plans are explained to them and an entire school year should be used with the personal learning plans. Completing the study over the course of an entire

school year would also help determine if the homework completion rates would hold. These students should then be tracked to see if they take more math classes than other students and what their success rate is in subsequent mathematics courses.

This process has shown the researcher that differentiation looks more daunting than it truly is. While preparation work is extensive for a class period, the long term work is lessened. Since students are working at their own pace within certain time constraints, there is almost never 150 papers to grade each night. The instructor will not have to pull so much of the weight during instruction. Students truly become independent learners and are self motivated. This is part of the dream of every teacher the researcher knows: independent, self motivated learners.

Summary

Differentiation is something almost all educators talk about doing these days. Carol Ann Tomlison is considered to be the leading expert in the field. She advocates that teachers must differentiate their classroom and look at each student as a true individual learner. The difficulty comes in how to differentiate, when to differentiate, and whether differentiation is fair to all students. The researcher believes that differentiation is a requirement for every classroom. While content should be changed only for special education students, the process should be changed for every student as needed. This study illustrated that the process can be modified for every student without chaos ensuing in the

classroom. Students could be taught from their entry point and brought up to meet the standards on an individual basis.

Teachers should not be looking for the bubble students as their way to raise test scores. They can use personal learning plans to raise all students to meet the standards. This is the true intent of the Response to Intervention law. This is what the researcher takes with her from this study. Do not look for only the group of students who are close to making it and focus on them. Focus your attention on the needs of each student and meet them where they are. You can help a student really learn if you teach from where you wish there were. All students can learn and this study shows that at risk Algebra students did learn the material without lowering standards. Teachers must keep the expectations the same for all students just change the methods used to achieve them.

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APPENDIX A

LEARNING STYLES INVENTORY SAMPLE



The VARK Questionnaire – The Younger Version

How Do I Learn Best?

Choose the answer which best explains your preference and circle the letter(s) next to it.
Please circle more than one if a single answer does not match your perception.
Leave blank any question that does not apply.

1. I like websites that have:
 - a. things I can click on and do.
 - b. audio channels for music, chat and discussion.
 - c. interesting information and articles in print.
 - d. interesting design and visual effects.
2. You are not sure whether a word should be spelled 'dependent' or 'dependant'. I would:
 - a. see the words in my mind and choose by how they look.
 - b. hear them in my mind or out loud.
 - c. find them in the dictionary.
 - d. write both words on paper and choose one.
3. You want to plan a surprise party for a friend. I would:
 - a. invite friends and just let it happen.
 - b. imagine the party happening.
 - c. make lists of what to do and what to buy for the party.
 - d. talk about it on the phone or text others.
4. You are going to make something special for your family. I would:
 - a. make something I have made before.
 - b. talk it over with my friends.
 - c. look for ideas and plans in books and magazines.
 - d. find written instructions to make it.
5. You have been selected as a tutor or a leader for a holiday program. This is interesting for your friends. I would:
 - a. describe the activities I will be doing in the program.
 - b. show them the map of where it will be held and photos about it.
 - c. start practising the activities I will be doing in the program.
 - d. show them the list of activities in the program.
6. You are about to buy a new digital camera or mobile phone. Other than price, what would most influence your decision?
 - a. trying it.
 - b. reading the details about its features.
 - c. it is the latest design and looks good.
 - d. the salesperson telling me about it.
7. Remember when you learned how to play a new computer or board game. I learned best by:
 - a. watching others do it first.
 - b. listening to somebody explaining it and asking questions.
 - c. clues from the diagrams in the instructions.
 - d. reading the instructions.

8. After reading a play you need to do a project. Would you prefer to:?
- write about the play.
 - act out a scene from the play.
 - draw or sketch something that happened in the play.
 - read a speech from the play.
9. You are about to hook up your parent's new computer. I would:
- read the instructions that came with it.
 - phone, text or email a friend and ask how to do it.
 - unpack the box and start putting the pieces together.
 - follow the diagrams that show how it is done.
10. You need to give directions to go to a house nearby. I would:
- walk with them.
 - draw a map on a piece of paper or get a map online.
 - write down the directions as a list.
 - tell them the directions.
11. You have a problem with your knee. Would you prefer that the doctor:
- showed you a diagram of what was wrong.
 - gave you an article or brochure that explained knee injuries.
 - described to you what was wrong.
 - demonstrated what was wrong using a model of a knee.
12. A new movie has arrived in town. What would most influence your decision to go (or not go)?
- you hear friends talking about it.
 - you read what others say about it online or in a magazine.
 - you see a preview of it.
 - it is similar to others you have liked.
13. Do you prefer a teacher who likes to use:
- demonstrations, models or practical sessions.
 - class discussions, online discussion, online chat and guest speakers.
 - a textbook and plenty of handouts.
 - an overview diagram, charts, labelled diagrams and maps.
14. You are learning to take photos with your new digital camera or mobile phone. I would like to have:
- examples of good and poor photos and how to improve them.
 - clear written instructions with lists and bullet points.
 - a chance to ask questions and talk about the camera's features.
 - diagrams showing the camera and how to use it.
15. You want some feedback about an event, competition or test. I would like to have feedback:
- that used examples of what I have done.
 - from somebody who discussed it with me.
 - that used a written description or table of my results.
 - that used graphs showing what I achieved.
16. You have to present your ideas to your class. I would:
- make diagrams or get graphs to help explain my ideas.
 - write a few key words and practice what to say again and again.
 - write out my speech and learn it by reading it again and again.
 - gather examples and stories to make it real and practical.

VARK

The VARK Questionnaire Scoring Chart

Use the following scoring chart to find the VARK category that each of your answers corresponds to. Circle the letters that correspond to your answers

e.g. If you answered b and c for question 3, circle V and R in the question 3 row.

Question	a category	b category	c category	d category
3	K	V	R	A

Scoring Chart

Question	a category	b category	c category	d category
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

Calculating your scores

Count the number of each of the VARK letters you have circled to get your score for each VARK category.

Total number of Vs circled =

Total number of As circled =

Total number of Rs circled =

Total number of Ks circled =

Calculating your preferences

Use the VARK spreadsheet (which can be purchased from the www.vark-learn.com web site) to work out your VARK learning preferences.

APPENDIX B

PERSONAL LEARNING PLAN SAMPLE

Name: _____ **Personal Learning Plan**

Learning Style: Audio Visual Reading Kinesthetic

Concepts – Unit B	Pre Test	Mastered	Post Test	Final Mark
1. Combine Like Terms				
a. One Variable and Constants				
b. Multiple Variables and Constants				
c. Various Exponents				
d. Perimeter Applications				
2. Distributive Property				
a. Once Time				
b. Multiple Times				
c. Area Applications				
3. Basic Equations				
a. Properties				
b. One Step – Add/Sub				
c. One Step - Multiplication				
d. One Step - Division				
e. Two Step Equations				
f. Two Step Variable Second				
4. Multi-Step Equations				
a. Variable Both Sides				
b. Distribution Both Sides				
c. Other Forms				
d. Write and Apply				

My Goals for the Unit:

Teacher Comments about my Progress:

Unit B1
Activity Matrix
Post Test (September 30, 2009)

	Reading (All Students)	Visual (Pick One Activity from this Section)	Auditory <i>Kinesthetic</i>	Homework
Combine Like Terms	Read Pages 107-109 Define like terms Give 3 examples of like terms Give two examples of non like terms	<ul style="list-style-type: none"> Use the TI-Software to complete a series of problems and describe the patterns you discover. Watch the Teacher Tube Lesson Use the block to model a series of problems. Draw your model on your paper. 		Complete the homework assignment showing your new knowledge
Distributive Property	Read Pages 100-102 Create an analogy to something in the real world that explains how the Distributive Property works	<ul style="list-style-type: none"> Watch the Power Point on the Distributive Property Watch the Teacher Tube Lesson Use the block to model a series of problems. Draw your model on your paper. 		Complete the homework assignment showing your new knowledge
Basic Equations	Read Pages 132-134 & 138-140 Fill in the Inverse Operations Chart	<ul style="list-style-type: none"> Use the teacher created examples as a guide for solving a series of problems Watch the Teacher Tube Lesson Use the blocks to model a series of problems. Draw your model on your paper. 		Complete the homework assignment showing your new knowledge
Multi-Step Equations	Read Pages 144-146 & 151-153 Write a Summary of how to solve an equation relating it to the Order of Operations	<ul style="list-style-type: none"> Mini Lesson from the teacher Watch the Teacher Tube Lesson Use the blocks to model a series of problems. Draw your model on your paper. 		Complete the homework assignment showing your new knowledge

APPENDIX C

PRE-TEST SAMPLE

Teacher Instructions

No Calculators!

Scoring: Mark answers either right or wrong. There is no partial credit on a pre-test. Students must earn 4 or 5 points to have mastered a skill and move on to the next one. After scoring of the pre-test, each student will complete a series of activities based on their individual areas of weakness. Students will then have to show mastery of a topic before they may move on to the next topic. A student will show mastery of a concept by achieving 80% or better on a skills quiz.

Use the following rubric to assess the students' mastery of Unit A. This guide should be used on the Post-Test of the unit to assess student knowledge.

Unit A Standards Based Assessment Scoring Guide

Grade	High End	Low End
A	Master all 5 Concepts at 80% accuracy or better	
B	Master 4 of the concepts at 80% accuracy or better AND 1 Concept at 60-79%.	
C	Master 4 of the concepts at 80% accuracy or better AND 1 Concept at 40-59%.	Master 3 of the concepts at 80% or better accuracy AND 2 Concepts at 60-79%
D	Master 3 of the concepts at 80% or better accuracy AND 1 concept at 60-79% AND 1 Concept at 40-59%	Master 3 of the concepts at 80% or better accuracy AND 2 Concepts at 40-59%
F	Master 3 of the concepts at 80% or better accuracy and 1 concept at 40-59%	Less than 3 concepts mastered

Name: _____

Unit A Pre-test**Directions: Answer each question to the best of your ability.**

1. A positive number minus a negative number is _____.
2. A negative number plus a negative number is _____.
3. A negative number multiplied by a negative number is _____.
4. A positive number divided by a negative number is _____.
5. A negative number divided by a positive number is _____.

Directions: Answer each of the following.

6. John needs to make \$100 to buy a new IPOD. He earns \$5 an hour after taxes doing data entry. How many hours must John work in order to have enough money for the IPOD?
7. Lunch at McDonalds cost \$7.43. If you hand the cashier \$10. How much change should you receive?
8. If Greg ran at a rate of 3 miles per hour for 2 hours, how many miles total did he run?
9. A window needs 6 yards of fabric, a second window needs 8 yards of fabric and a third window requires 3 yards of fabric. How many total yards of fabric must you purchase to cover all three windows?
10. Mrs. Tanascu spent \$12 on folder, \$18 on pencils, and \$15 on notebooks for her class of 15 students. How much money did she spend per student?

Directions: Simplify each of the following. Show your work!

11. $12 \div 3 \cdot 2 + 5$

12. $|9 - 6 + 1| + |-15| + 4|-3|$

13. $(6 - 4)^3 - 5 + 2$

14. $-5^2 - (12 + 1)$

15.
$$\frac{8^2 - 4}{(-4 + 9)(12 \div 2)}$$

Directions: Evaluate each of the following.

16. $2x + 6$ when $x = 4$

17. $a + b - c$ when $a = 2$, $b = 7$, and $c = 12$

18. $5w^2 - 1$ when $w = 3$

19. $\frac{j + k}{2}$ when $j = -8$ and $k = -10$

20. $p^2 - p^2 + r - 5$ when $p = 2$ and $r = -3$

Directions: Translate each of the following into symbols.

21. A number increased by forty is ten.

22. The quotient of m and p decreased by three.

23. Triple the square of a number is three hundred.

24. The product of six and a number increased by eight is twelve.

25. Twenty less than a number is greater than thirty-six.

APPENDIX D

POST-TEST SAMPLE

Name: _____
 No Calculators Allowed

Unit A Post Test

YOU MUST SHOW YOUR WORK IN ORDER TO RECEIVE CREDIT!

Simplify:

1. $15 - 8 + 3$

2. $1 - -6 + 2$

3. $|14| + |-2| - |-8|$

4. $5| - 2| + 24 \div 8 \cdot 3$

5. A positive number multiplied by a negative number is _____.

6. A negative number divided by a negative number is _____.

7. Explain what 9^4 means?

8. $\frac{17 - -5}{4} - \frac{6^2 - 8 + 17}{3^2}$

Evaluate Each Expression

9. Let $x \sim y = x^3 + 4y - 9$, Find $5 \sim 4$

10. When $x = 12$, what is the value of $3x - 87$

11. $T(x) = \frac{x^2}{x}$, Find $T(8)$.

12. When $x = -6$, what is the value of $x(2x - 10) + 4$?

13. Let $a \nabla b = \frac{3b}{5a}$, Find $10 \nabla 50$

14. When $y = 3$, $m = -4$ and $x = 7$, what is the value of ymx ?

Translate each of the Following into Symbols

15. The product of ten and a number.

16. The quotient of thirteen and a number is one.

17. Double the sum of five and a number.

18. Four times the square of a number is thirty.

19. The product of seven and a number decreased by two is greater than nine.

Simplify

20. $[12(\cancel{4}) - 12(3)]^2 - 5 \cdot 3$

21. $-6(4 + 10) + |-13|$

22. Write the correct order of operations.

23. Why is absolute value never negative?

24. What did Mrs. Tanascu do wrong in the problem below?

$$-8^2 + 10 \cdot 3 - 7 + 4$$

$$-64 + 30 - 11$$

$$-34 - 11$$

$$-45$$

Solve each of the following.

25. To make cuts for a living room window for a customer, you will need three pieces of fabric in the following lengths: 4 feet, 8 feet, and 2 feet. What is the total length of fabric you will need?
26. The fraternity house you manage has 6,270 square feet of lot space. City ordinance allows one student for every 330 square feet of lot space. How many students can live in this house?
27. You receive a \$20 bill for a pair of work pants that costs \$13.21 with tax. What change should you give with the pants?
28. You can safely haul 11 large fence posts at a time in your pickup truck. How many trips would it take to haul 213 fence posts?
29. The safety rating at the construction company that you work for has decreased by 22 points this year. If last year's rating was 79, what is this year's rating?
30. You sell pies at a farmer's market for \$7.50 each. A group of five kids wants to pitch in equally to share one of your pies. How much will each of them need to pay to buy a whole pie together?

APPENDIX E
UNIT A ACTIVITY MATRIX

Unit A Activity Matrix

Post Test (September 11, 2009)

	Reading (All Students)	Visual Auditory Kinesthetic (Pick One Activity from this Section)	Everyone
Real Numbers	Using the notes guide for this section read and summarize pp. 78-80, 86-88, and 93-95	<ul style="list-style-type: none"> Use the giant number line to complete a series of problems Listen to the teacher tube lessons on the computer Mini Lesson from the teacher. Use the blocks to complete a series of exercises. Draw the model on your paper to show your work. 	Complete the homework assignment showing your new knowledge (SEE TEACHER FOR HANDOUT)
Application of Math Facts	Circle the buzz words in the problem telling you which operation to use.	<ul style="list-style-type: none"> Draw a picture of the situation to aide in your solution. Work with a partner to discuss the options and then implement your solution process. Use the blocks to model the situations presented. Draw the model on your paper to show your work. 	Complete the homework assignment showing your new knowledge(SEE TEACHER FOR HANDOUT)
Order of Operations	After reading pages 15-17 and 71-73, Create a poster that illustrates the correct order of operations.	<ul style="list-style-type: none"> Watch the Power Point that is scrolling across the screen. Listen to the teacher tube lesson on the computer. Mini Lesson from the teacher Play the Operations Bingo Game with the dice as instructed. 	Complete the homework assignment showing your new knowledge (SEE TEACHER FOR HANDOUT)
Evaluating Expressions	After reading the pages 3-5, Write a summary in 2-3 sentences of how to evaluate expressions	<ul style="list-style-type: none"> Use the teacher created examples as your guide to complete a series of problems on your own. Listen to teacher recording on how to evaluate expressions. Use the blocks to model the situations presented. Draw the model on your paper to show your work. 	Complete the homework assignment showing your new knowledge(SEE TEACHER FOR HANDOUT)
Translating Words to Symbols	After reading pages 30-32, Create a "cheat sheet" for the buzz words for addition, subtraction, multiplication, division, equalities, and inequalities	<ul style="list-style-type: none"> Use the teacher created examples as your guide to complete a series of problems on your own. Listen to the teacher tube lesson on the computer. Use the giant symbols to cover up the words in the statement. You will need your "cheat sheet" for this exercise. 	Complete the homework assignment showing your new knowledge(SEE TEACHER FOR HANDOUT)